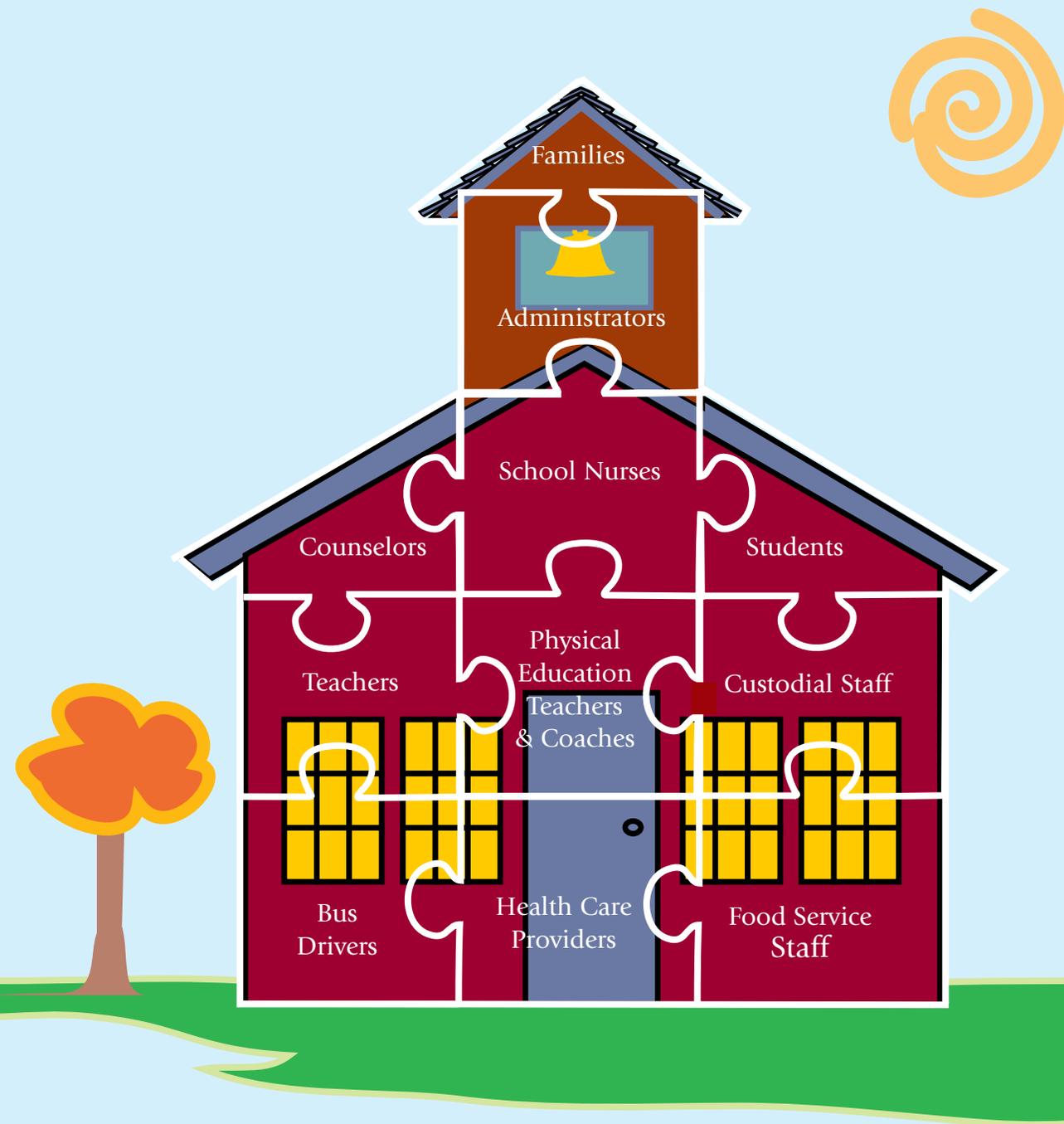


Guidelines for Managing Asthma in Virginia Schools:

A Team Approach



Virginia Department of Health in collaboration with
Virginia Department of Education and the Virginia Asthma Coalition

October 2003



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Introduction

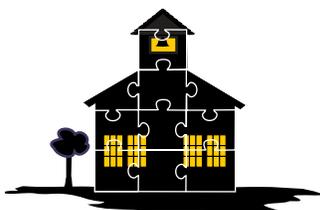
The purpose of the *Guidelines for Managing Asthma in Virginia Schools: A Team Approach* is to provide students, staff, and parents with a basic understanding of proper management of students with asthma.

Asthma, one of the most common chronic diseases among children and adolescents, is recognized as one of the leading medical causes of absenteeism among school age children. Adequate understanding of the disease and proper management is key to controlling asthma, improving the health of students with asthma, and reducing absenteeism rates.

In order for students to gain the motivation, skill, and confidence needed to control asthma, students, parents, and school staff need to know how the disease affects breathing, identify and control asthma triggers, recognize warning signs of an episode, and follow an asthma management plan. With adequate control, students with asthma can avoid missing classroom instructional time and participate fully in extracurricular activities.

Successfully managing asthma in our schools will help decrease absences caused by asthma, decrease disruptions in classes caused by asthma emergencies, and provide support to help students with asthma.

It is our hope that this technical assistance guide will promote student health and achievement in the Commonwealth.





Asthma Overview

What is Asthma?

Asthma is a chronic lung disease and is one of the most common chronic diseases among children. It causes airway inflammation. When this inflammation occurs, the lungs react and produce muscle tightening, mucous, and swelling in the breathing tubes of the lungs. People with asthma then start to wheeze, cough, feel chest tightness, and have a hard time breathing. During severe attacks, they may feel like they are suffocating. Students can die from asthma attacks (American Lung Association of Minnesota [ALAMN], 2003; American Lung Association [ALA]-Childhood, 2003).

Approximately 6.3 million children in the United States have asthma (U.S. Environmental Protection Agency [EPA] – America’s, 2003) and 3.8 million children have had an asthma attack within the past year. Most children do not grow out of asthma. Almost 75% of children with asthma continue to suffer from the disease during adulthood and the number of children with asthma is increasing (ALA–Focus, 2003).

Why is Asthma Serious?

Asthma may affect a child or adolescent’s ability to:

- concentrate;
- pay attention;
- participate in physical activities;
- think clearly;
- relate to other children;
- feel energetic; and
- achieve in school because of frequent absences.

In the United States, students miss approximately 10 million school days a year because of asthma (ALAMN, 2003). Among the chronic diseases of childhood, it is the most common reason children miss school. Asthma also is the most common chronic condition limiting physical activity (ALA–Childhood, 2003). It is important to understand that although asthma cannot be cured, it can be controlled and managed to allow normal activity.

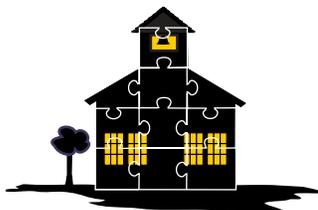
Asthma occurs more frequently in Hispanic and African American children than white children. For example, mainland Puerto Rican children are three times more likely to have asthma than non-Hispanic white children. Hispanic children also have a higher asthma death rate (ALA-Focus, 2003).

Non-Hispanic black children suffer from asthma at twice the rate as non-Hispanic white children, and black children are three times more likely to be hospitalized for asthma treatments (ALA-Focus, 2003).

Other chronic health conditions also may affect the seriousness of asthma. Overweight children with asthma have more frequent and longer-lasting symptoms from asthma attacks. (National Center for Education in Maternal and Child Health [NCEM-CH], 2001).

Students Most Often Affected by Asthma Are:

- Adolescents
- African American
- Males
- From low-income families
- From single-parent families
- From inner-city families





Why is Asthma Included in the Code of Virginia?

Because of the number of students affected by asthma in Virginia schools, a law was passed to assure that students have easy access to their asthma medications while they are at school. The Code of Virginia allows students to carry and self-administer asthma medications at school. Specifically, Section 22.1-274.2 of the *Code of Virginia*, requires local school boards to develop and implement policies to permit a student with asthma to possess and self-administer inhaled asthma medications during the school day, on school property, or at school-sponsored events (Appendix 2).

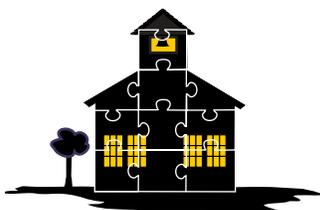
This section requires that:

- parents give written consent that the student can self-administer inhaled asthma medications;
- healthcare provider gives written approval that the student may self-administer inhaled asthma medications;
- school develops an individualized health care plan for the student;
- school board permits students with asthma to possess and self-administer inhaled asthma medications; and
- school consults with a student's parents before the school limits or restricts the student's use of an inhaler.

Why Use a Team Approach to Asthma Management?

The team approach to managing asthma in schools is based on the concept that all school staff need to work together to understand the seriousness of asthma, to help prevent asthma attacks, and to help students manage asthma symptoms.

The team approach cannot occur without the full support of the school's administration, teachers, coaches, school nurses, custodial staff, bus drivers, food service workers, students, and parents.





Causes of Asthma Attacks

Asthma occurs when something, usually in the environment, irritates the cells in the lungs and causes the breathing tubes to tighten and the lining of the breathing tubes to swell and fill with mucus plugs. As the airways narrow and students try to breathe out through the narrowed airway, they cough, wheeze, or have difficulty breathing.

Common Environmental Asthma Triggers

Things that cause this narrowing of the airway usually are called asthma triggers and may include:

- Tobacco smoke
- House dust mites
- Cockroaches
- Cat dander
- Dog dander
- Other pets such as birds, hamsters, guinea pigs
- Wood smoke
- Air pollution (sulfur dioxide, high ozone levels)
- Perfumes
- Strong odors
- Aerosol sprays (room deodorizers, hair spray, colognes)
- Cold air
- Grass
- Tree pollens

One of the most significant triggers is tobacco smoke. Children living with adults who smoke are twice as likely to have asthma as children living with non-smokers (ALA-Focus, 2003) and exposure to second-hand smoke increases the frequency and severity of asthma attacks.

Exercise-Induced Asthma Triggers

In over 80% of children with asthma, running and other vigorous exercise such as field hockey or soccer, can trigger an asthma attack. Some children with asthma, however, only wheeze or cough during exercise and show no asthma symptoms when they are not exercising.

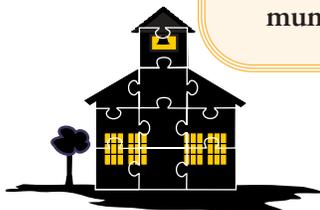
Exercise-induced asthma (EIA) usually occurs during or immediately after vigorous physical activity and symptoms may last from a few minutes to several hours. These symptoms may occur in children whose asthma is poorly controlled or children who have not yet been diagnosed with asthma. Some studies suggest that as many as 10% of youngsters may have EIA without knowing it and are first identified during physical education class.

Asthma can be controlled during physical activity when the student takes a medication before exercise that will keep the airways open. In fact, most students with asthma can participate in all physical activities as long as they remember to take their asthma medication 15-20 minutes before exercise (ALA-Childhood, 2003).

Common Exercise-Induced Asthma Triggers

Common triggers related to physical activity include (ALA-Childhood, 2003):

- **Running-** Running can trigger an asthma attack in over 80% of children with asthma. The act of running causes airways to swell, produce more mucous, and make it difficult to breath.
- **Hot or Cold weather-** Some children with asthma are very sensitive to temperature extremes and may need to exercise inside on very hot or very cold days.
- **Respiratory Infections-** Children with asthma should not exercise if they have a cold or other lung infection.
- **Molds, Pollen, and Ozone-** Other students are very sensitive to molds, pollens, and ozone and need to exercise indoors when the community is under a mold, pollen or ozone alert.





Other Medical Conditions

The following medical conditions can increase the frequency and severity of someone's asthma.

- Viral respiratory infections (colds, “bronchitis”)
- Allergies
- Sinus infections
- Gastric reflux (stomach acid may irritate airways)

Approximately 75-80% of children with asthma have allergies (ALA-Childhood, 2003). Common allergens include pollen, mold, dust, and animal dander. Between six and eight percent of children with asthma also are allergic to certain foods that may trigger their asthma (American Academy of Allergy, Asthma, and Immunology, 1999). Thirty-seven percent of children with asthma are allergic to cockroaches; 35% to dust-mites; and 23% to cats (ALA-Focus, 2003).

Emotional Factors

Emotional stress may trigger or worsen an asthma attack. For example, when a child cries, yells, or laughs, he or she begins to breathe rapidly and this can trigger an attack. Also, children often become anxious during asthma attacks because they are having trouble breathing. This anxiety may worsen the attack (ALA-Childhood, 2003).

Common Environmental Triggers in Schools

Since children and adolescents spend a significant amount of their day in school, it is important to consider triggers that may exist in the school environment. Once these triggers are recognized, action can be taken to eliminate or minimize them.

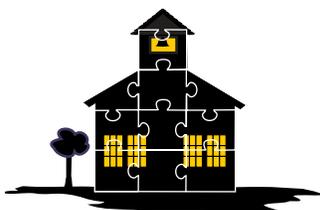
Common environmental triggers in schools include (USEPA, 2000, 2003):

- Cockroaches and other pests
- Molds (particularly in carpets, walls, and near ventilation systems)
- Dander from animals in classrooms
- Chalk dust
- Secondhand smoke (unless the campus is smoke free)
- Dust mites
- Chemical pollutants (substances in science and art classes; air fresheners; and perfume sprays)
- Improperly maintained ventilation systems

Avoiding Triggers

Although the presence of all triggers cannot be controlled, it is important to identify ways to decrease exposure to as many triggers as possible. Examples of ways to avoid some triggers are:

- staying indoors when outdoor air pollution, pollen, and mold spores are worse than normal or pre-medicating prior to recess or outdoor time;
- central air conditioning schools to keep some pollen and dust outside and keep mold levels low; and
- avoiding air temperature extremes (not too hot or too cold) or using physical barriers, such as scarves, in cold weather or exercising indoors.





Asthma Treatment

Although asthma cannot be cured, it is possible to treat and manage it successfully. Asthma management follows guidelines from the National Asthma Education and Prevention Program (National Institutes of Health [NIH], 2002 and Appendices 5 and 6). Management consists of prevention, asthma care plans, monitoring symptoms, and correct use of medications.

Prevention

The most important asthma management strategy is to avoid asthma triggers. Recommendations include (ALA-Focus, 2003):

- create a smoke-free school environment;
- minimize indoor pollution (i.e., cockroaches, dust mites, pets); and
- avoid outdoor pollution (i.e., high ozone levels, temperature extremes, high sulfur dioxide levels, etc.).

Schools also need to provide students and staff with asthma management programs to learn to appropriately treat asthma symptoms.

Asthma Care Plan

The parent, student, school, and health care provider must develop an Asthma Care Plan for use in school. The Asthma Care Plan should be designed to help the student manage his or her asthma. Children and adolescents should be involved as much as possible in the management process. When a student is not able to manage his or her symptoms, an adult should be trained to provide assistance.

The Asthma Care Plan is a detailed outline of how to manage asthma on a day to day basis and describes what to do in an emergency. It includes information about the student, the student's medications, and emergency contact information (Figure 1).

In comparison, an Emergency Asthma Action Plan is an abbreviated Asthma Care Plan that includes only essential information and may be given to non-medical school staff to help them know how to respond appropriately in the event of an emergency. An example of an Emergency Asthma Action Plan is included in Figure 2.

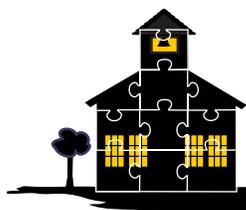


Figure 1



Asthma Care Plan

SOUTHEASTERN VIRGINIA ASTHMA HEALTH CARE ACTION PLAN & AUTHORIZATION FOR MEDICATION

TO BE COMPLETED BY PARENT:

Child's Name _____ Date of Birth _____ School _____ Grade _____

Parent/Caregiver _____ Phone (H) _____ Phone (W) _____ Phone (Cell) _____

Address _____ City _____ Zip _____

Emergency Contact _____ Relationship _____ Phone _____

Name of Physician _____ Office phone number _____

What triggers your child's asthma attack: (Check all that apply)

<input type="checkbox"/> Illness	<input type="checkbox"/> Cigarette or other smoke	<input type="checkbox"/> Food _____
<input type="checkbox"/> Emotions	<input type="checkbox"/> Exercise	<input type="checkbox"/> Allergies <input type="checkbox"/> cat <input type="checkbox"/> dog <input type="checkbox"/> dust <input type="checkbox"/> mold <input type="checkbox"/> pollen
<input type="checkbox"/> Weather changes	<input type="checkbox"/> Chemical odors	<input type="checkbox"/> Other _____

Describe the symptoms your child experiences before or during an asthma episode: (Check all that apply)

<input type="checkbox"/> Cough	<input type="checkbox"/> "Tightness" in chest	<input type="checkbox"/> Rubbing chin/neck
<input type="checkbox"/> Shortness of breath	<input type="checkbox"/> Breathing hard/fast	<input type="checkbox"/> Feeling tired/weak
<input type="checkbox"/> Wheezing	<input type="checkbox"/> Runny nose	<input type="checkbox"/> Other _____

TO BE COMPLETED BY PHYSICIAN:

The child's asthma is: mild persistent moderate persistent severe persistent EXERCISE-INDUCED

Symptoms	Peak Flow OR Monitoring	Treatment																														
<ul style="list-style-type: none"> • No cough or wheeze • Able to sleep through the night • Able to run and play • Usual medications control asthma 	<p>GREEN ZONE WELL</p> <p>> _____</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 33%;">Controllers</th> <th style="width: 33%;">How much</th> <th style="width: 34%;">When</th> </tr> </thead> <tbody> <tr><td><input type="checkbox"/> Advair</td><td></td><td></td></tr> <tr><td><input type="checkbox"/> Flovent (with spacer)</td><td></td><td></td></tr> <tr><td><input type="checkbox"/> Pulmicort</td><td></td><td></td></tr> <tr><td><input type="checkbox"/> Singulair</td><td></td><td></td></tr> <tr><td><input type="checkbox"/> Serevent</td><td></td><td></td></tr> <tr><td><input type="checkbox"/> Other</td><td></td><td></td></tr> <tr> <th colspan="3" style="text-align: center;">Relievers</th> </tr> <tr> <td><input type="checkbox"/> Albuterol (with spacer/nebulizer)</td> <td>2 puffs 1 minute apart prn</td> <td><input type="checkbox"/> 20 min before exercise</td> </tr> <tr><td><input type="checkbox"/> Other</td><td></td><td></td></tr> </tbody> </table>	Controllers	How much	When	<input type="checkbox"/> Advair			<input type="checkbox"/> Flovent (with spacer)			<input type="checkbox"/> Pulmicort			<input type="checkbox"/> Singulair			<input type="checkbox"/> Serevent			<input type="checkbox"/> Other			Relievers			<input type="checkbox"/> Albuterol (with spacer/nebulizer)	2 puffs 1 minute apart prn	<input type="checkbox"/> 20 min before exercise	<input type="checkbox"/> Other		
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<input type="checkbox"/> Albuterol (with spacer/nebulizer)	2 puffs 1 minute apart prn	<input type="checkbox"/> 20 min before exercise																														
<input type="checkbox"/> Other																																
<ul style="list-style-type: none"> • Increased asthma symptoms (shortness of breath, cough, chest pain) • Wakes at night due to asthma • Unable to do usual activities • Needs reliever medications more often 	<p>YELLOW ZONE SICK</p> <p>_____ to _____</p>	<ol style="list-style-type: none"> 1. <input type="checkbox"/> Continue daily controller medications 2. Give albuterol 2 puffs (one minute between puffs) with spacer or by nebulizer <ul style="list-style-type: none"> <input type="checkbox"/> If no improvement, repeat 2 puffs or nebulizer and wait 20 minutes <input type="checkbox"/> If no improvement, repeat 2 puffs or nebulizer. This will be 3 doses in one hour, proceed to 3 3. If child returns to Green Zone: <ul style="list-style-type: none"> <input type="checkbox"/> Continue to give albuterol 2 puffs every 4 hours for 1 to 2 more days AND <input type="checkbox"/> Increase controller to _____ for next 7 days 4. <input type="checkbox"/> No physical exercise <input type="checkbox"/> Physical exercise as tolerated <p>If child remains in Yellow Zone for more than 1-2 days or requires albuterol more than every 4 hours, call your doctor NOW!</p>																														
<ul style="list-style-type: none"> • Very short of breath, difficulty breathing • Constant cough • Reliever medications do not help 	<p>RED ZONE EMERGENCY!</p> <p>< _____</p>	<p>Give albuterol (2 puffs with spacer or by nebulizer) NOW, and repeat every 20 minutes for 2 more doses – Call your doctor</p> <p>Seek emergency care or call 911 if:</p> <ul style="list-style-type: none"> ▪ Child is struggling to breathe and there is no improvement 20 minutes after taking albuterol ▪ Trouble talking or walking ▪ Lips or fingernails are gray or blue ▪ Chest or neck is pulling in with breathing 																														

For inhaled medications:

<input type="checkbox"/> Student is able to perform procedure alone and may carry the inhaler with them, consult school nurse for local protocol	<input type="checkbox"/> Student is able to perform procedure with supervision
<input type="checkbox"/> Student requires a staff member to perform procedure	

Notify health care provider if:

<input checked="" type="checkbox"/> More than 2 absences related to asthma per month	<input checked="" type="checkbox"/> The child is persistently in the Yellow Zone
<input checked="" type="checkbox"/> Albuterol is being used as a rescue medication 2 times per week at school	

Current school year

Provider Signature

Date

I give my permission for school personnel to follow this plan, administer medication and care to my child and contact my physician if necessary. I assume full responsibility for providing the school with prescribed medication and monitoring device. I approve this Asthma Management Plan for my child.

Parent Signature

Date



Figure 2

Emergency Asthma Action Plan

Student: _____

Grade/Room: _____

Emergency Medication: _____

Parent: _____

Contact Numbers _____

If you see this:	Do this:
<ul style="list-style-type: none"> • Complains of chest tightness • Coughing • Difficulty breathing • Wheezing 	<ul style="list-style-type: none"> • Stop activity • Have student take 1 puff of rescue inhaler • Wait 1 minute • Have student take 2nd puff of rescue inhaler • Have student rest • If no improvement in 15 minutes, repeat 2 puffs • If still no improvement, call school nurse • If symptoms worsen, call 911 & call parents

If you see this:	Do this immediately:
<ul style="list-style-type: none"> • Coughs constantly • Struggles or gasps for breath • Chest and neck pulled in with breathing • Stooped over posture • Trouble walking or talking • Lips or fingernails are gray or blue 	<ul style="list-style-type: none"> • Call 911 • Give rescue medication • Call parents

Source: Praeger & Zickler, 2002.



Monitoring Asthma through Peak Flow Meters

One way to measure the status of a student's asthma is to use a peak flow meter. The peak flow reading can indicate if the student's asthma is worsening. National guidelines recommend that individuals with moderate or severe persistent asthma may use peak flow meters to help manage asthma symptoms (NIH, 2002). However, not all children use peak flow meters. Figure 3 describes how to use a peak flow meter.

A peak flow meter is a hand-held device that measures how well the student is breathing. It measures the student's ability to force air out of the lungs. For example, if the airways are very swollen and the student cannot push out air very well, the meter reading will be very low. If the airways are not swollen and the student is breathing normally, the Peak Flow reading will be much higher (ALA-Peak, 2003).

Students with moderate or severe asthma often use a peak flow meter to determine if they need to take rescue medications. Children as young as 3 may be taught to use a meter (ALA). The meter also may help students identify asthma triggers or determine the time of the day when asthma worsens. This information will help the student and health care provider refine the asthma treatment plan.

A "personal best" "normal" peak flow reading depends on a student's age, height, sex, and race. The "personal best" reading is recorded on the student's Asthma Care Plan (ALA-Peak, 2003).

Peak flow readings usually are divided into the following three zones.

1. Green = Go

This means the student is breathing between 80% and 100% of the personal best peak flow reading. Usually, no changes in medication are made.

2. Yellow = Caution

This means the student is breathing between 50% and 80% of the personal best peak flow reading. This usually means that the airways are narrowing and the student is starting to have difficulty breathing. However, it also may mean that the airways are improving and the student is moving from the Red to Green zones. In either case, the Emergency Asthma Action Plan should be used to determine the prescribed treatment.

3. Red = Stop

This means the student is breathing at less than 50% of personal best capacity and immediate action needs to be taken. Refer to the Emergency Asthma Action Plan and give the student their rescue medication immediately.

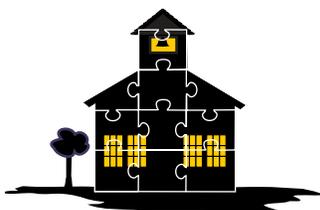
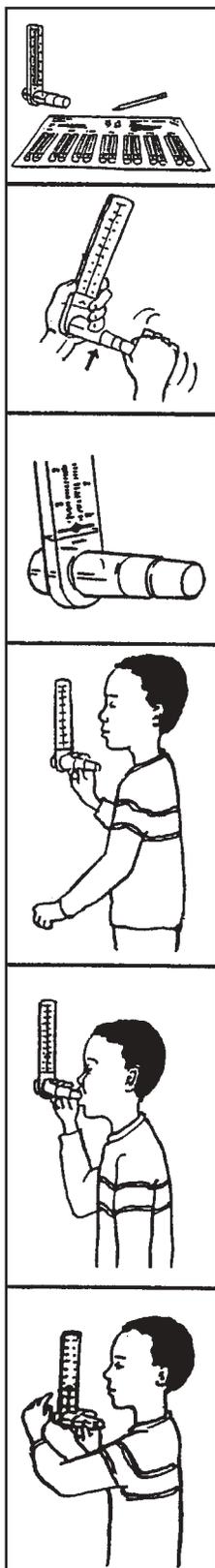


Figure 3



How to use a peak flow meter



Step 1: Slide the marker or arrow to the bottom of the scale (zero or lowest number).

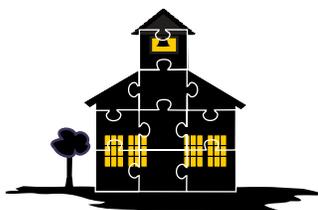
Step 2: Stand up straight. Remove gum & food from the mouth. Take a deep breath. Close the lips around the mouthpiece. Do not put fingers over the slide. Blow as hard and fast as possible.

Step 3: Remove the meter from the mouth and look at the arrow on the slide. Write down this number.

Step 4: Repeat Steps 1, 2, and 3 two more times.

Step 5: Use the highest of the 3 readings to find the zone in the Emergency Asthma Action Plan and follow directions for that zone.

Source: ALA-Peak, 2003; Illustrations from Asthma and Allergy Foundation of America, *You Can Control Asthma: A Book for Kids*.





Medications

There are two types of medications that are used to control asthma symptoms. One type of medication is used for quick relief when a student has asthma symptoms and one is used to prevent asthma symptoms.

Emergency, Quick Relief, or Rescue Medications

Emergency medications work very quickly (within a few minutes) and are used to open the airways in asthma attacks. They also are called bronchodilators rescue, short-acting, or quick relief medications and should be used at the first sign of asthma symptoms. They work by relaxing the muscles in the air tubes and expanding the airways so a child or adolescent can breathe normally. They usually work for four hours and also may be used before exercise to keep the airways open (NIH, 2001).

Quick relief medications often are delivered through metered dose inhalers. Students with asthma should always have their emergency inhaler with them or have easy access to the inhaler. A teacher or another adult should carry the emergency inhaler for a young child and be prepared to help the child use it.

Examples of common bronchodilators that are emergency medications include:

- Albuterol (Proventil, Ventolin)
- Pirbuterol (Maxair)
- Terbutaline (Breathaire)

Prevention Medications

Anti-inflammatory and other long-acting medications are used to prevent asthma symptoms. They work slowly (usually over a 12 or 24-hour period) and keep airways open by decreasing the inflammation or swelling in the airways and the amount of

mucous produced. They help to maintain normal lung function and prevent asthma episodes. They **will not** stop an asthma attack. Examples of common prevention medications include:

Metered Dose or Diskus Inhalers:

Combination

- Fluticasone + Salmeterol (Advair)

Corticosteroids

- Beclomethasone (QVAR, Vanceryl)
- Budesonide (Pulmicort)
- Flunisolide (Aerobid)
- Fluticasone (Flovent)
- Triamcinolone acetonide (Azmacort)

Long-acting beta2-agonists

- Formoterol (Foradil)
- Salmeterol (Serevent)

Nonsteroidal

- Cromolyn sodium (Intal)
- Nedocromil sodium (Tilade)

Oral Medications:

Corticosteroids

- Methylprednisolone (Medrol)
- Prednisolone (Pediapred, Prelone)
- Prednisone (Orasone, Sterapred)
- Triamcinolone (Aristocort)

Leukotriene modifiers

- Montelukast (Singulair)
- Zafirlukast (Accolate)
- Zileuton (Zyflo)

Theophylline

- Slo-bid
- THEO-DUR

A student may use more than one long-acting, prevention medication to control

asthma symptoms (NIH, 2002).

Caution

It is very important to understand the differences between emergency and long-acting prevention medications. They treat different problems associated with asthma and should *never* be used interchangeably. Also, children with asthma should not take over-the-counter medications to control their asthma without the written permission from their medical provider. *This particularly includes over-the-counter inhalers.*





Allergy medications

Some children with asthma have environmental allergies that can trigger asthma attacks. Therefore, these children may be on long-acting medications to control their allergies and, consequently, their asthma. Common over-the-counter and prescription medications, usually taken at home, include:

- Brompheniramine (ingredient in Bromfed, Dimetapp, Rondec)
- Cetirizine (Zyrtec)
- Chlorpheniramine (Chlor-Trimeton)
- Desloratadine (Clarinex)
- Diphenhydramine (Benadryl)
- Fexofenadine (Allegra)
- Loratadine (Claritin)

Delivery Devices for Asthma Medications

Metered Dose Inhalers

Many asthma medications are delivered through Metered Dose Inhalers (MDI). These devices spray a fine mist of medication into the airways. The inhalers may be used with or without a spacer device. The spacer is easy to use and significantly increases the amount of medication reaching the lungs. Children 5 years old or younger usually are too young to use inhalers without spacer devices (Figures 4 & 5, Appendix 4).

Nebulizers

Nebulizers are machines that help deliver asthma medication into the lungs. Nebulizers usually are used when the student's emergency medication has not relieved asthma symptoms or when the student is unable to use a metered dose inhaler. The nebulizer unit consists of the pumping machine, tubing, and a mouthpiece or mask. Medication is added to the unit and dispensed through

the mouthpiece or mask. The student usually receives a treatment for 10-15 minutes. Recent studies suggest that a MDI with a spacer is as effective, if not more effective, than a nebulizer for many children.

Stepwise Asthma Treatment

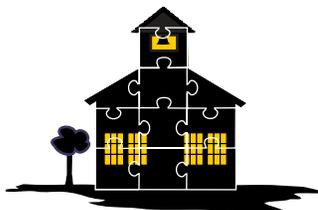
Asthma is divided into four levels or steps based on the seriousness of the symptoms. The symptoms include shortness of breath; wheezing; rapid, shallow breathing; or needing to use stomach muscles to breathe (NIH, 2002). The step approach to treatment may be used for all infants and children with asthma (Table 1, Appendices 5 & 6).

With the Step System, children can step up to a higher step if they need more medicine to control their asthma or step down to a lower step if they need less medicine to control their asthma symptoms.

Goals of Treatment

The goals of asthma treatment are for students to have:

- no symptoms during the day or night;
- no episodes of shortness of breath, wheezing, or difficulty breathing;
- no school missed because of asthma;
- no activities missed because of asthma;
- lung function as normal as possible;
- infrequent need for rescue medicines; and
- no side effects from the medicines.





How to Use an Inhaler

Steps for Using a Metered Dose Inhaler (MDI)

- Step 1: Take off the cap and shake the inhaler.
- Step 2: Stand up.
- Step 3: Hold the inhaler approximately 1 inch in front of the lips (2 finger-widths).
- Step 4: Breathe out.
- Step 5: When starting to breathe in, push down on the top of the MDI and continue breathing in slowly for 3-5 seconds.
- Step 6: Hold the breath for 10 seconds and breathe out.
- Step 7: Wait 1 minute between puffs.

Steps for Using a Dry Powder Inhaler

- Step 1: Do not shake the device.
- Step 2: Take off the cap.
- Step 3: Close the mouth tightly around the mouthpiece.
- Step 4: Breathe in very fast when inhaling the medication.

Source: (NIH, 2001; Illustrations from Asthma and Allergy Foundation of America, *You Can Control Asthma: A Book for Kids*)



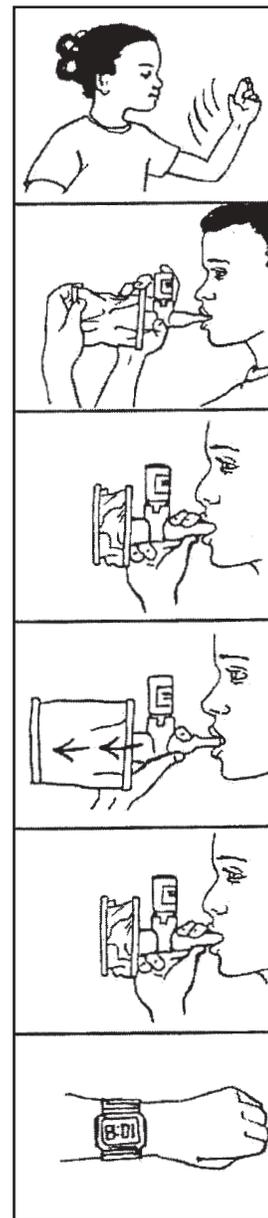
How to Use a Spacer



Steps for Using a Metered Dose Inhaler (MDI) with a Spacer

- Step 1: Take off the cap and shake the inhaler.
- Step 2: Attach the inhaler to the spacer.
- Step 3: Stand up.
- Step 4: Put the spacer mouthpiece in the mouth and close the lips tightly over the mouthpiece.
- Step 5: Start to breathe in slowly and push down once on the top of the MDI.
- Step 6: Keep breathing in slowly and hold the breath for 5 seconds.
- Step 7: Breathe out.
- Step 8: Breathe in again slowly and hold the breath for 5 seconds.
- Step 9: Breathe out. This completes "1 puff."
- Step 10: Wait 1-2 minutes and repeat steps 4-9 if the Asthma Care Plan requires 2 puffs.

Source: (Illustrations from Asthma and Allergy Foundation of America, *You Can Control Asthma: A Book for Kids*)





Stepwise Asthma Treatment

Step 1 Mild Intermittent Asthma

- A child has symptoms on 2 or fewer days a week or
- A child has symptoms on 2 or fewer nights a month

Usually, a child only takes asthma medication when he or she has symptoms.

Step 2 Mild Persistent Asthma

- A child has symptoms on more than 2 days a week but less than once a day or
- A child has symptoms on more than 2 nights a month

A child usually takes a medication every day to prevent symptoms when he or she has Mild Persistent Asthma.

Step 3 Moderate Persistent Asthma

- A child has symptoms every day or
- A child has symptoms more than 1 night a week

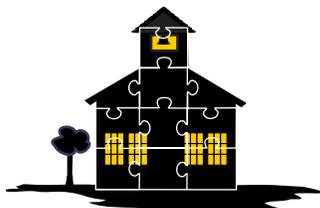
A child with Moderate Persistent Asthma usually is on 1 or 2 medications every day to prevent asthma symptoms.

Step 4 Severe Persistent Asthma

- A child has continuous symptoms during the day or
- A child has frequent symptoms at night

A child with Severe Persistent Asthma usually is on 2 or 3 long-acting medicines to prevent asthma symptoms.

Source: NIH, 2002





Treating Asthma Attacks

Symptoms of an Asthma Attack

Coughing is the most common symptom of asthma. Children with asthma often start coughing after running, laughing, or crying. They tend to cough more at night and have colds, bronchitis, and other respiratory infections more frequently than children without asthma (ALA-Childhood, 2003).

Wheezing also is a common symptom of asthma. Wheezing is a high-pitched squeaky sound that occurs when air passes through swollen, narrow air passages in the lungs (ALA-Childhood, 2003).

Other symptoms include chest tightness and shortness of breath. Children may have difficulty talking or become anxious when they are having an asthma attack (ALA-Childhood, 2003). Very young children may complain of stomach aches, headaches, or scratchy throats when their asthma is worsening.

Other signs and symptoms of an asthma attack include (ALA, 1997):

- student has less energy than usual;
- student is out of breath and may be unable to talk;
- student's neck muscles tighten with each breath;
- student's chest seems to suck in with each breath; and
- student's nail beds and lips may turn grayish or blue.

Most Common Signs of an Asthma Attack

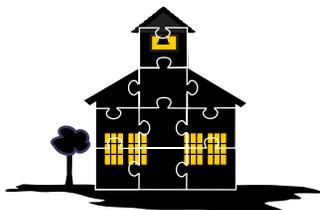
- Coughing
- Wheezing
- Chest Tightness
- Shortness of Breath

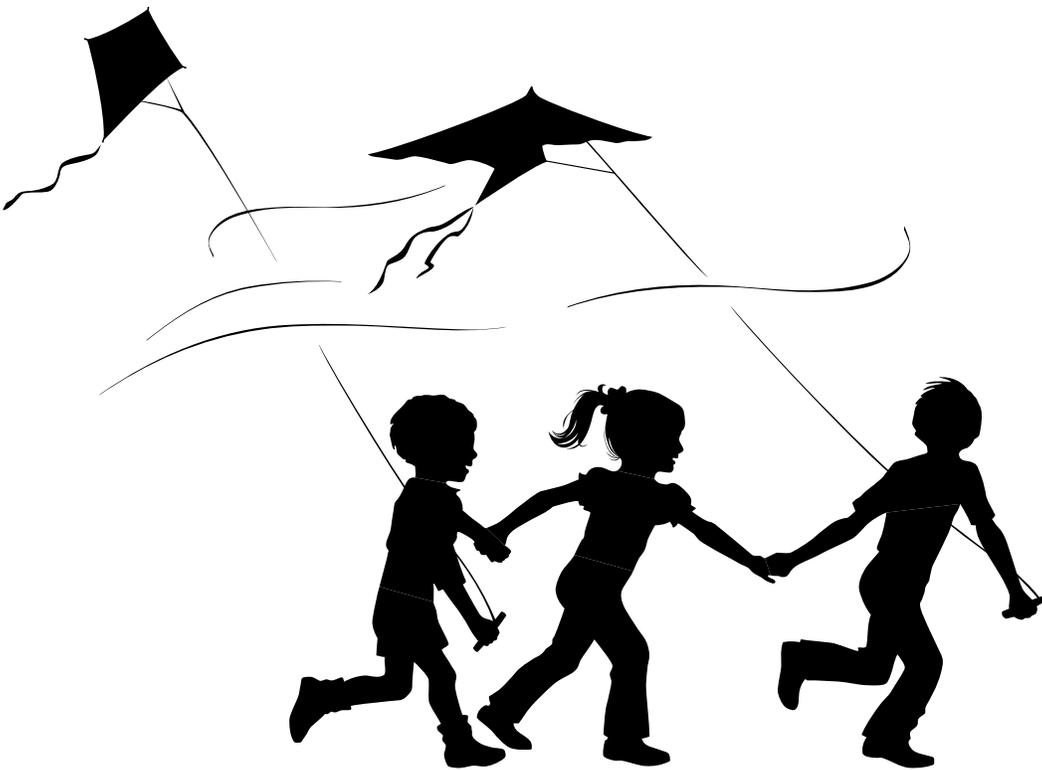
Actions to Take in an Asthma Attack

- Have the student **sit** in a comfortable position.
- Stay **calm**.
- Follow instructions on the student's **Emergency Asthma Action Plan**.
- Do a **peak flow reading** if this is part of the Emergency Asthma Action Plan.
- **Administer medication** if this is part of the Emergency Asthma Action Plan.
- **Re-assess** the student in 5-10 minutes.
- **If no improvement or symptoms worsen**, follow instructions on the Emergency Asthma Action Plan and call the school nurse.
- If necessary, **call 911**.
- Call student's parents.
- If the episode ends and the student is breathing normally, the student may return to class (but should avoid strenuous physical activity the rest of the day).

What to Do in an Asthma Attack

- Stay calm
- Follow *Emergency Asthma Action Plan*
 - Help student use Emergency/Rescue Inhaler
 - Encourage student to breath slowly and deeply
 - Get help if student isn't getting better
 - Call 911 if student is getting worse or having difficulty breathing







The Team Approach

The Centers for Disease Control and Prevention (CDC) encourages schools to manage asthma using a coordinated school health framework consisting of the following six strategies (CDC, 2002).

1. Establish management and support systems for asthma-friendly schools.
2. Provide appropriate school health and mental health services for students with asthma.
3. Provide asthma education and awareness programs for students and school staff.
4. Provide a safe and healthy school environment to reduce asthma triggers.
5. Provide safe, enjoyable physical activity opportunities for students with asthma.
6. Coordinate school, family, and community efforts to better manage asthma symptoms and reduce school absences among students with asthma.

Within this framework, the asthma management team members include school board and school health advisory board members, superintendents and principals, classroom and physical education teachers, coaches, playground supervisors, school nurses, counselors, building engineers, school bus drivers, food service workers, and PTA members. School staff play an important role to help the student with asthma manage the disease at school.

The school nurse usually leads the school asthma management team. Suggested roles and responsibilities for school staff, students, and families are outlined in the following sections.

Administrators

Administrative team members help manage asthma in the school when they:

- adopt an Asthma Management Plan for the school that includes use of medication, inhalers, Asthma Care Plans, and emergency procedures;

- provide school-based asthma education programs for students and staff;
- designate a non-smoking campus;
- aggressively eliminate or reduce asthma triggers; and
- support a comprehensive approach to treatment.

Bus Drivers

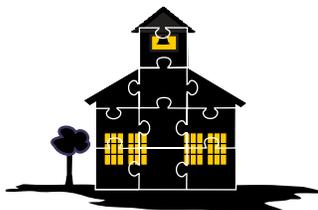
School bus drivers are key partners in asthma management during the transit to and from school. They need to:

- know who has asthma on their bus;
- have an Emergency Asthma Action Plan for every student with asthma;
- know how to help the student manage his or her asthma; and
- avoid idling buses whenever possible to reduce diesel fumes (Reilly, 2000).

Counselors

Counselors and other mental health team members help manage asthma in the school when they:

- encourage parents and students to participate in the development of Asthma Care Plans;
- counsel students who have difficulty taking medications as prescribed in their Asthma Care Plan;
- help students overcome any discomfort or embarrassment they may feel because of an asthma diagnosis;
- help students and families identify community resources to obtain medications and supplies;
- work with students and parents to help reduce or eliminate triggers in the home; and
- support a comprehensive approach to treatment.





Custodial Staff

Custodial staff need to know how to help a student manage an asthma attack. However, one of their greatest roles is to help reduce asthma triggers by (USEPA, 2000):

- scheduling major cleaning activities during after-school hours;
- reducing mold by fixing leaks as soon as possible and removing standing water within 24-48 hours;
- maintaining indoor humidity levels between 30% and 60%;
- using poison baits, boric acid, or traps before using pesticide sprays to eliminate pests; and
- notifying school staff and parents if pesticide sprays are used in classrooms. The sprays should be used when the room is unoccupied and has sufficient time to air out before students return.

Food Service Staff

Food service staff need to know how to help a student manage his or her asthma. They also can help eliminate asthma triggers including cockroaches and other pests by (USEPA, 2000):

- storing food in sealed containers;
- sweeping and wet mopping floors daily to remove food;
- cleaning stoves and ovens after every use;
- wiping counters clean with soap and water or a disinfectant;
- removing trash daily;
- fixing moisture problems;
- disposing of food, contaminated paper and plastic products in covered containers to discourage pests;
- placing dumpsters away from the building; and
- removing clutter.

Physical Education Teachers & Coaches

Physical education teachers and coaches often are the first school staff to identify students with asthma and assist with the management of a student's symptoms. Their goal is to keep students with asthma as symptom-free and physically active as possible and most students with asthma can participate in physical activities if they remember to take their medication before exercise. When children with asthma are physically fit, they have fewer problems with their asthma, use less medication, and miss fewer days from school (NCEMCH, 2001).

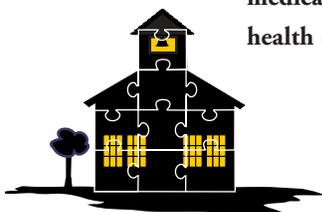
“The role of physical education teachers is in some ways probably the first line of recognition of children who have problems with their asthma... They can really help these children.”

Dr. David Evans, Columbia University
(NIH, 1995).

Physical education teachers and coaches help students with asthma when they:

- know which students have asthma and have a copy of each student's Emergency Asthma Action Plan;
- report previously undiagnosed students with new symptoms to the school nurse and parents;
- encourage students to follow their Asthma Care Plan and use a rescue or emergency inhaler 15-20 minutes before exercise to help prevent attacks – some individuals may respond better to inhalers used 20-30 minutes before exercise;
- have ready access to the student's prescription rescue medication on-site during physical activity. **Students with asthma should never use over-the-counter asthma medications unless they have written approval from their health care provider** (VHSL, 2002);

Continued on the next page





- recognize signs of exercise-induced asthma;
- make necessary modifications to physical activities based on environmental factors. Recommendations for physical activities are listed in Table 2;
- follow the Emergency Asthma Action Plan if a student complains of asthma symptoms;
- stop a student from participating in physical activity if the peak flow reading is below 80% (Yellow or Red zones) or if the student is complaining of asthma symptoms;
- take appropriate actions to control asthma symptoms and notify the school nurse and the student's parents if a student experiences asthma symptoms during physical activity; and
- help students keep asthma symptoms under good control to stay physically active and able to participate in all activities.

Is it really asthma?

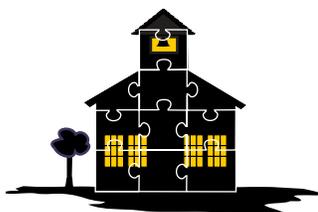
If a student consistently seems to avoid physical activity and blames it on asthma or if symptoms do not match the level of exertion, **the teacher always should respond as if the student is experiencing the reported symptoms.** After appropriate treatment is given, the teacher should discuss any concerns with the student, school nurse, and/or parents. The student may be avoiding physical activity for an unrelated reason. (NIH, 1995)

Table 2

Physical Activity Recommendations for Students with Asthma

1. Include warm-up and cool-down periods before and after exercise.
2. Consult Emergency Asthma Action Plan to identify any restrictions on physical activity.
3. Limit activity for a child who just had an asthma attack. He or she is at increased risk for having another attack for the next few hours.
4. Consider a change in location if an allergen or irritant is present (recently mowed field; newly refinished gym floor).
5. Make necessary modifications to activities to include children with asthma.
6. Keep children involved in the class even if they can't fully participate.
7. Avoid outdoor activity in cold weather.
8. Maintain aerobic fitness.
9. Restrict exercise if the student has a respiratory infection.
10. Keep the student's rescue medication on-site.

Source: NIH, 1995 & VHSL, 2002





School Nurses

The school's registered nurse offers assistance to students with asthma and is a health care resource to other staff. The nurse plays a vital role through education of students, staff, and parents.

Actions of the school nurse may include:

- developing and maintaining the Asthma Care Plan with the student, family, and health care provider and developing the Emergency Asthma Action Plan for other school staff (Figures 1 and 2);
- alerting appropriate school staff about students with asthma;
- communicating information about the Emergency Asthma Action Plan to appropriate school staff;
- administering medication when the student is unable to administer his/her own medication;
- monitoring effectiveness of medication;
- monitoring the use of the peak flow meter;
- conducting trainings for students, parents, and staff; and
- collaborating with health care providers, community organizations, and parent groups to help control asthma in the school.

If a school nurse is not available in the school, other staff members must be trained to provide these services.

Roles of the School Nurse

- Identify students with asthma.
- Identify a student's needs.
- Help develop the Asthma Care Plan and the Emergency Asthma Action Plan.
- Interact with students, parents, health care providers, and school staff.
- Deliver treatments.
- Monitor a student's health status.
- Provide asthma in-services for students, families, and staff.

Source: Praeger & Zicklee, 2002 & Reilly, 2000

Teachers

Classroom teachers often are the first to identify students with new or worsening asthma symptoms and provide assistance to students who are having difficulty breathing. They need to be active members of the school's asthma team and need to know which students in their classrooms have asthma. They also need to:

- obtain a copy of the student's Emergency Asthma Action Plan from the school nurse or school administration (parents need to approve the sharing of this information);
- review the Emergency Asthma Action Plan with the school nurse and know what to do in an emergency;
- schedule necessary conferences with the parents, the student, and school nurse;
- know what triggers the student's asthma;
- try to reduce triggers in the classroom; and
- know what to do in an emergency.

If a student has asthma, the teachers should talk with the student privately about the asthma diagnosis and, if the student and parents agree, talk with all students in the class about asthma to:

- tell them the signs of an asthma attack;
- discuss what to do if a classmate has an attack (do not disclose the student's name without permission from the student and parents);
- discuss common triggers; and
- share what students can do to reduce triggers in the classroom.

Providing this information about asthma management should help students learn what to do in an emergency, reduce the fear surrounding asthma, and help them remain calm in an emergency.





Reduce Classroom Triggers

- **Keep birds and furry animals out of the classroom.**
- **Use dust-free chalk or white boards with non-toxic markers.**
- **Keep the room as dust-free as possible.**
- **Avoid strong perfumes and odors**

Source: Modified from ALA, 1998

Students

In general, students should be responsible for managing their own asthma. For example, students in early elementary school can be taught to use peak flow meters and to self-administer medication. In Virginia's public schools, students must have written permission from their parents and health care provider to carry and self-administer inhaled asthma medications in school.

To manage asthma symptoms, students can:

- learn as much as they can about asthma so they can control asthma symptoms;
- know what medications to take for asthma and when to take them;
- learn how to use a Metered Dose Inhaler;
- never stop taking the medication without talking with their health care provider;
- learn how to use a peak flow meter and what to do when readings are in the Green, Yellow, or Red zones;
- keep the peak flow meter clean;
- carry a copy of their Emergency Asthma Action Plan; and
- know when to take their rescue or emergency medication and always carry the medication with them.

Adolescents can assume even more responsibility for managing their asthma. They can (ALA–Teens, 2003):

- learn as much as possible about asthma and how their medications work;
- work with their health care provider to develop an Asthma Care Plan they can live with;
- know what to do in an emergency and follow their Emergency Asthma Action Plan;
- let their school nurse or health care provider know if their Asthma Care Plan is not working and they are still having asthma attacks;
- learn how to use their inhaler properly;
- always keep their rescue inhaler with them and make sure it isn't empty;
- tell their friends they have asthma so they can help in an emergency;
- manage their asthma so they can participate in sports and other activities;
- record what triggers their asthma attacks and try to avoid these triggers;
- recognize the warning signs of an asthma attack and take their rescue medication as soon as possible; and
- never smoke and avoid being around second-hand smoke.





How Can Students Manage Their Asthma

- Take medications regularly.
- Take the right amount of medication.
- Keep an emergency inhaler with them and use it if symptoms appear.
- Don't run out of medications.
- Use deep breathing if asthma symptoms start.
- Tell friends, teachers, and people at work that the student has asthma.
- Try not to limit activities because of asthma.
- Identify asthma triggers and avoid them.
- Know the warning signs of an asthma attack.
- Store medications properly.
- Keep medications out of reach of young children.

Source: Modified from ALA-*When You Can't Breathe*, 1997

Families

Families are at the center of the student's asthma management plan. They need to (ALAMN, 2003):

- notify the school that their child has asthma;
- develop an Asthma Care Plan with the student, school nurse, and health care provider;
- assure that appropriate school staff have a copy of the care plan;
- tour the school to help identify asthma triggers;
- assure that the student has immediate access to rescue medication during the school day;

- assure that the student takes prevention medications as prescribed; and
- inform the school of any changes in treatment.

Families also can help reduce asthma triggers at home.

Triggers include (ALA-Home, 2003):

- cigarette smoke that can irritate the lungs and trigger an asthma attack. When parents stop smoking, their child's asthma symptoms improve;
- wood stoves and fireplaces may trigger asthma attacks;
- pets (cats, dogs, birds, hamsters, guinea pigs, etc.) may trigger allergies and asthma attacks. Families should consider removing pets from the home if they make the child's asthma symptoms worse;
- cockroaches also may trigger allergy and asthma attacks and should be safely eliminated from the home. Pesticides should be used with care. Roach sprays and foggers also may trigger asthma attacks;
- molds grow in areas of high humidity including basements, kitchens, and bathrooms and may trigger an asthma attack. Dehumidifiers should be cleaned often to prevent mold growth;
- household cleaning supplies, room deodorizers, perfumes, paint, and talcum powder may trigger allergy and asthma attacks;
- dust also may trigger asthma attacks. Dust mites are microscopic spiders that live in mattresses, pillows, bedding, upholstered furniture, carpeting, drapes, stuffed animals, and clothing. It may be necessary to remove many of these items from the child's bedroom and cover the mattress and pillows in allergen-impermeable covers to help prevent asthma attacks; and
- temperature extremes may trigger asthma attacks.

Common Asthma Triggers at Home

- Tobacco smoke
- Indoor molds
- Cockroaches
- Strong odors or fumes
- Wood smoke
- Pets
- Hot or cold air
- Dust mites
- Perfumes

Source: ALA-Home,2003

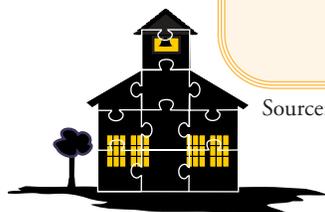




Table 3

Ways to Reduce or Remove Asthma Triggers From a Child's Room

1. Remove the following from a child's room:
 - Rugs
 - Soft chairs and couches
 - Heavy curtains
 - Stuffed animals
 - Extra pillows
 - Dusty toys, books, and clothes
2. Use air filters and air conditioners and clean them frequently.
3. Try to control dust mites in the child's bedroom by keeping the room as clean as possible. Put plastic covers on the mattresses and pillow. Use polyester blankets (not wool or down comforters). Wash sheets, blankets, and stuffed animals in hot water weekly to kill dust mites.
4. Use a vacuum cleaner with a good filtration system.
5. Avoid vacuuming when the child with asthma is in the home.

Source: Asthma & Allergy Foundation of America, *You Can Control Asthma, A Book for the Family*, 1998.

Health Care Medical Providers

The student's health care provider (physician, nurse practitioner, or physician assistant) will collaborate with the school team in the management of the child's asthma in school.

The health care provider is responsible for diagnosing the student with asthma and giving the school written instructions ("orders") on how to treat the student's asthma during the school day including related school activities.

The health care provider's written instructions are incorporated into the Asthma Care Plan and the Emergency Asthma Action Plan. Both plans are signed by the health care provider, parent, student (if appropriate), and registered school nurse (or other school representative).

The Asthma Care Plan should include written permission from the parent for the school nurse to contact the health care provider to discuss any concerns related to the control of the student's asthma during school activities.

It is appropriate for the school nurse to send a blank Asthma Care Plan and Emergency Asthma Action Plan to the health care provider's office or give blank forms to the parent to take to the provider's office. Copies of the completed Asthma Care Plan and Emergency Asthma Action Plan should be given to the provider, parent, student (if appropriate), and school nurse.

According to the Virginia Chapter of the American Academy of Pediatrics (modified from Lara, et al., 2002), the health care provider should:

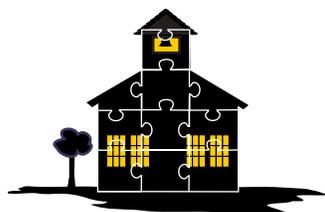
- provide a medical home for the child with asthma;
- schedule clinical assessments to review the effectiveness of asthma management on a regular basis consistent with the severity of the condition;
- manage acute episodes of asthma;
- communicate with the school team to provide information on asthma severity and management;
- contribute to the development of the child's school Asthma Care Plan;

Continued on the next page





- prescribe medications that provide both quick relief and asthma control;
- complete school medication administration forms when medications must be administered in school;
- recommend MDI spacers, nebulizers, and peak flow meters consistent with the Asthma Care Plan;
- provide ongoing asthma education to parents and child during office visits;
- promote child's full participation in school physical activities;
- support the school's asthma training programs by advising on content and participating in training as requested by the school team; and
- advocate for school resources to help manage asthma in collaboration with the School Health Advisory Board.





Asthma Training Programs

An asthma education program in the school helps students control their asthma symptoms and reduces the burden on the school staff caused by uncontrolled asthma.

According to the Virginia Association of School Nurses, the goals of school-based asthma training programs are to:

- promote a supportive learning environment for students with asthma and their parents;
- reduce absences due to asthma;
- reduce disruption in the classroom caused by asthma attacks;
- provide necessary emergency support to students; and
- achieve full participation in physical and extracurricular activities for students with asthma.

An asthma education program in the school helps students control their asthma symptoms and helps to minimize the burden on the school staff resulting from uncontrolled asthma attacks.

A school nurse or asthma specialist from the community may teach a stand-alone asthma education program, or information about asthma may be integrated into a health or science curriculum. The first option usually targets children with asthma. The second option provides useful information to all students within the school.

Program objectives for children with asthma are to:

- develop a basic understanding of asthma and help correct misinformation;
- inform students about appropriate asthma management and actions that can help people with asthma; and
- provide resources to share with parents and other family members.

Training Guidelines for asthma management programs are described in Appendix 7.

Training Resources for Elementary Students

Asthma Awareness Curriculum for the Elementary

Classroom was produced by the National Heart, Lung, and Blood Institute. It is a downloadable asthma education program for the elementary school teacher that can be integrated into a health education curriculum.

(<http://www.nhlbi.nih.gov/health/proflung/asthma/schooll/index.htm>)

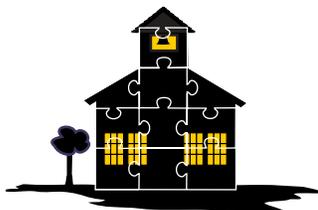
Asthma Care Training (ACT) for Kids was developed by the UCLA School of Nursing and supported by the Asthma and Allergy Foundation of America to help children from 7-12 years of age and their parents control asthma. (<http://www.aafa.org>)

Bon Secours School Asthma Program is offered in the Richmond Metropolitan Area. The six-session program is conducted by registered nurses and is geared for 3rd to 5th grade students. Parents are encouraged to attend the classes. (email: lburns@carmakids.org)

Clear the Air Puppet Show for K to 4th grade students discusses the dangers of second-hand smoke. This program is available from the American Lung Association. (<http://www.lungusa.org/virginia/clear.html>)

Open Airways for Schools is a school-based program promoted by the American Lung Association. The program is geared for children from 8-11 years of age and teaches children to identify signs of asthma and the triggers. Children who have completed this program have fewer and less severe asthma attacks, do better in school, and are able to help manage their asthma. The program consists of six, 40-minute sessions, taught by volunteers. The program is available in Spanish. (<http://www.lungusa.org/events/astopen.html>)

You Can Control Asthma is a school-based program developed by the Asthma and Allergy Foundation of America for elementary students ages 6 to 12 years old and their parents. Materials are available in English and Spanish. (<http://www.aafa.org>)





Training Resources for Secondary Students

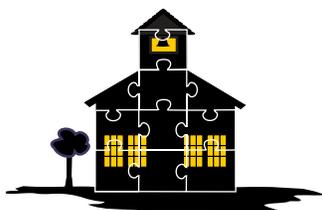
Not On Tobacco (N-O-T) is a smoking cessation program for high school students supported by the American Lung Association. (<http://www.lungusa.org/tobacco/not>)

Power Breathing is a three-session asthma education program for secondary students sponsored by the Asthma and Allergy Foundation of America. (<http://www.aafa.org>)

Teens Against Tobacco Use (TATU) is a project supported by the American Lung Association. (<http://www.lungusa.org>)

Training Resources for Parents

Freedom From Smoking (FFS) is a smoking cessation class for adults supported by the American Lung Association. (<http://www.lungusa.org>)





How Asthma Friendly is Your School?

One of the most effective ways to help control asthma in the school is to improve the school environment by reducing asthma triggers.

Conducting an assessment

The following questions (adapted from NIH's *How Asthma Friendly is Your School?* brochure) may be used as a checklist to determine how friendly your school is to students with asthma. Classroom, building maintenance, and cafeteria checklists are listed in Appendix 8.

1. Is the school free of tobacco smoke at all times?
2. Does the school maintain good indoor air quality (does it reduce or eliminate asthma triggers)?
3. Is a school nurse in your school all day, every day?
4. Can students self-administer medications at school as recommended by their health care providers?
5. Does your school have an emergency plan for students when they have a severe asthma attack?
6. Does someone teach staff and all students about asthma management?
7. Do students have good options for participating in physical education classes and recess?

Reducing the Triggers

There are many simple ways to reduce common asthma triggers including:

Carpeting – Instead of carpeting, use wood, tile, or vinyl floor coverings (NIH-*How Asthma Friendly is Your School?*).

Strong irritants and odors – Schedule maintenance or pest control activities using strong chemicals when students are not in the building. Air out the building if these products are used (NIH-*How Asthma Friendly is Your School?*). Irritants also include chemicals used in classrooms, such as chemistry labs.

Classroom Animals – Remove animals from the classroom. Warm-blooded animals produce proteins that act as allergens (dander, urine, and saliva) and can trigger asthma. These allergens may stay in the environment for several months after the animal has been removed (USEPA, 2000).

Cockroaches – Cockroaches also emit proteins (in waste products and saliva) that act as allergens and trigger asthma attacks (USEPA, 2000). The EPA recommends using Integrated Pest Management practices that include storing food in sealed containers and placing dumpsters away from the building to reduce the use of pesticides and to help manage pests (USEPA, 2003).

Mold – Clean up mold by fixing leaks and other moisture problems. Thoroughly dry wet areas within 24-48 hours to prevent mold growth (USEPA, 2003).

Tobacco Smoke – Enforce no-smoking policies in the school (USEPA, 2003).

Dust Mites – Regularly and thoroughly dust and vacuum the school when the students are not in the building (USEPA, 2003).

Air Cleaners – Air cleaners may emit ozone that can trigger asthma symptoms in some students (USEPA, 2000).

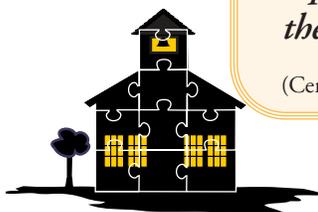
Food – Check food preparation, cooking, and storage areas for signs of cockroaches and other pests and assure that appropriate food preparation, cooking, and storage practices are in place (USEPA, 2000).

Resources for Schools

The U.S. Environmental Protection Agency has developed the *Indoor Air Quality Tools for Schools: Managing Asthma in the School Environment* program to help schools manage asthma. This program includes an assessment tool to determine the asthma friendliness level of your school.

“Asthma-friendly schools are those that make the effort to create safe and supportive learning environments for the students with asthma.”

(Centers for Disease Control & Prevention, 2002).







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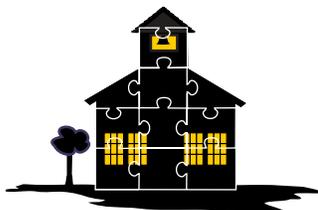
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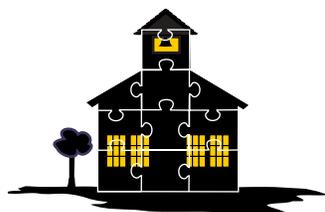
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Appendix 1



Asthma Resources

Allergy and Asthma Network/Mothers of Asthmatics, Inc.

<http://www.aanma.org>

American Lung Association

1740 Broadway, 14th Floor
New York, NY 10019
1-800-LUNG-USA
<http://www.lungusa.org>

American Lung Association

Asthma Busters - A club for children with asthma
<http://www.asthmabusters.org>

Asthma and Allergy Foundation of America

1125 15th St., NW, Suite 502
Washington, DC 20005
1-800-7-ASTHMA
<http://www.aafa.org>

AsthmaMoms

<http://www.asthmamoms.com>

BAM: Meet Disease Detective, Dr. Asthma

<http://www.bam.gov/detectives/meet.htm>

BAM: Don't Let Asthma Keep You Out of the Game

<http://www.bam.gov/fit4life/dont.htm>

Centers for Disease Control and Prevention

(770) 488-7320
<http://www.cdc.gov/nccdphp/dash/healthtopics/asthma>

National Association of School Nurses

(207) 883-2117
<http://www.nasn.org>

National Asthma Education and Prevention Program

<http://www.nhlbi.nih.gov>

National Education Association Health Information Network

(800) 718-8387
<http://www.neahin.org>

National Heart, Lung, and Blood Institute

National Asthma Education and Prevention Program
P.O. Box 30105
Bethesda, MD 20824
(301) 251-1222
<http://www.nhlbi.nih.gov/guidelines/asthma/index.htm>

National Parent Teacher Association

(800) 307-4PTA
<http://www.pta.org>

US Environmental Protection Agency

Indoor Air Division
“Indoor Air Quality: Tools for Schools”
401 M St., SW
Washington, DC 20460
<http://www.epa.gov/iaq>



Appendix 2

Section 22.1-274.2 Code of Virginia

§ 22.1-274.2. Possession and self-administration of inhaled asthma medications by asthmatic students.

A. Effective on July 1, 2000, local school boards shall develop and implement policies permitting a student with a diagnosis of asthma to possess and self-administer inhaled asthma medications during the school day, at school-sponsored activities, or while on a school bus or other school property. Such policies shall include, but not be limited to, provisions for:

1. Written consent of the parent, as defined in § 22.1-1, of a student with a diagnosis of asthma that the student may self-administer inhaled asthma medications.
 2. Written notice from the student's primary care provider or medical specialist, or a licensed physician or licensed nurse practitioner that (i) identifies the student; (ii) states that the student has a diagnosis of asthma and has approval to self-administer inhaled asthma medications that have been prescribed or authorized for the student; (iii) specifies the name and dosage of the medication, the frequency in which it is to be administered and certain circumstances which may warrant the use of inhaled asthma medications, such as before exercising or engaging in physical activity to prevent the onset of asthmatic symptoms or to alleviate asthmatic symptoms after the onset of an asthmatic episode; and (iv) attests to the student's demonstrated ability to safely and effectively self-administer inhaled asthma medications.
 3. Development of an individualized health care plan, including emergency procedures for any life-threatening conditions.
 4. Consultation with the student's parent before any limitations or restrictions are imposed upon a student's possession and self-administration of inhaled asthma medications, and before the permission to possess and self-administer inhaled asthma medications at any point during the school year is revoked.
 5. Self-administration of inhaled asthma medications to be consistent with the purposes of the Virginia School Health Guidelines and the Guidelines for Specialized Health Care Procedure Manuals, which are jointly issued by the Department of Education and the Department of Health.
 6. Disclosure or dissemination of information pertaining to the health condition of a student to school board employees to comply with §§ 22.1-287 and 22.1-289 and the federal Family Education Rights and Privacy Act of 1974, as amended, 20 U.S.C. § 1232g, which govern the disclosure and dissemination of information contained in student scholastic records.
- B. The permission granted a student with a diagnosis of asthma to possess and self-administer inhaled asthma medications shall be effective for one school year. Permission to possess and self-administer inhaled asthma medications shall be renewed annually. For the purposes of this section, "one school year" means 365 calendar days. (2000, c. 871.)



Appendix 3

Asthma Care Plan

This form should be completed collaboratively by the student, parent, health care provider, and school nurse and used to develop the Asthma Care Plan and to help manage the student's asthma while in school.

What usually starts an asthma attack?

- Exercise
- Respiratory infections
- Change in temperature
- Animals
- Food _____
- Strong odors or fumes
- Chalk dust or dust
- Carpets
- Pollens
- Molds
- Other _____

Control of School Environment (List environmental control measures, pre-medications, and/or dietary restrictions that the student needs to prevent an asthma attack.)

Peak Flow Monitoring

Personal Best Peak Flow number: _____

Green Range _____ to _____

Yellow Range _____ to _____

Red Range _____ to _____

Daily Medication Plan

Name	Amount	When to Use
1. _____		
2. _____		
3. _____		
4. _____		

Comments/Special Instructions

For Inhaled Medications

- I have instructed _____ in the proper way to use his/her medications. It is my professional opinion that _____ should be allowed to carry and use that medication by him/herself at school.
- It is my professional opinion that _____ should not carry or use his/her inhaled medication by him/herself.

Health Care Provider _____ Date _____

Parent/Guardian _____ Date _____

Student _____ Date _____

School Representative _____ Date _____

Modified from Asthma and Allergy Foundation of America *Daily Asthma Management Plan*



Appendix 4

Care of Asthma Medication and Equipment

Asthma Medication

Asthma medication should be kept at room temperature whenever possible.

Dry Spacers

Some of the newer asthma medications come in a plastic disk that dispenses a dry powder. This device records the number of puffs left in the container and should be kept dry.

Metered Dose Inhalers (MDI)

Metered dose inhaler (MDI) canisters do not need to be cleaned. The plastic container may be cleaned with mild soap and water.

Students need to record the number of times they have used their inhaler so they do not run out. For example, if a student takes 2 puffs from his long-acting or prevention medication twice a day, he uses 4 puffs a day, 28 puffs a week, and 96 puffs a month. The total number of puffs is listed on the MDI canister.

It is more difficult to keep track of the rescue or emergency inhaler because the student uses it less frequently. Therefore, he needs to record the number of times he uses the inhaler each day to make sure that he does not run out of medicine during an asthma attack. The total number of puffs is listed on the MDI canister.

Peak Flow Meters

Peak flow meters should be cleaned regularly with mild detergent and warm water (ALA-Peak, 2003).

Spacers

Plastic spacers should be cleaned with mild soap and water. Do **not** wash expandable bags or the medicine canister.

Appendix 5

Stepwise Approach for Managing Infants and Young Children (5 Years of Age and Younger) With Acute or Chronic Asthma



Classify Severity: Clinical Features Before Treatment or Adequate Control		Medications Required To Maintain Long-Term Control
	Symptoms/Day Symptoms/Night	Daily Medications
Step 4 Severe Persistent	Continual Frequent	<ul style="list-style-type: none"> ■ Preferred treatment: <ul style="list-style-type: none"> – High-dose inhaled corticosteroids AND – Long-acting inhaled beta₂-agonists AND, if needed, – Corticosteroid tablets or syrup long term (2 mg/kg/day, generally do not exceed 60 mg per day). (Make repeat attempts to reduce systemic corticosteroids and maintain control with high-dose inhaled corticosteroids.)
Step 3 Moderate Persistent	Daily > 1 night/week	<ul style="list-style-type: none"> ■ Preferred treatments: <ul style="list-style-type: none"> – Low-dose inhaled corticosteroids and long-acting inhaled beta₂-agonists OR – Medium-dose inhaled corticosteroids. ■ Alternative treatment: <ul style="list-style-type: none"> – Low-dose inhaled corticosteroids and either leukotriene receptor antagonist or theophylline. <p>.....</p> <p>If needed (particularly in patients with recurring severe exacerbations):</p> <ul style="list-style-type: none"> ■ Preferred treatment: <ul style="list-style-type: none"> – Medium-dose inhaled corticosteroids and long-acting beta₂-agonists. ■ Alternative treatment: <ul style="list-style-type: none"> – Medium-dose inhaled corticosteroids and either leukotriene receptor antagonist or theophylline.
Step 2 Mild Persistent	> 2/week but < 1x/day > 2 nights/month	<ul style="list-style-type: none"> ■ Preferred treatment: <ul style="list-style-type: none"> – Low-dose inhaled corticosteroid (with nebulizer or MDI with holding chamber with or without face mask or DPI). ■ Alternative treatment (listed alphabetically): <ul style="list-style-type: none"> – Cromolyn (nebulizer is preferred or MDI with holding chamber) OR leukotriene receptor antagonist.
Step 1 Mild Intermittent	≤ 2 days/week ≤ 2 nights/month	<ul style="list-style-type: none"> ■ No daily medication needed.

<p>Quick Relief</p> <p>All Patients</p>	<ul style="list-style-type: none"> ■ Bronchodilator as needed for symptoms. Intensity of treatment will depend upon severity of exacerbation. <ul style="list-style-type: none"> – Preferred treatment: Short-acting inhaled beta₂-agonists by nebulizer or face mask and space/holding chamber – Alternative treatment: Oral beta₂-agonist ■ With viral respiratory infection <ul style="list-style-type: none"> – Bronchodilator q 4–6 hours up to 24 hours (longer with physician consult); in general, repeat no more than once every 6 weeks – Consider systemic corticosteroid if exacerbation is severe or patient has history of previous severe exacerbations ■ Use of short-acting beta₂-agonists >2 times a week in intermittent asthma (daily, or increasing use in persistent asthma) may indicate the need to initiate (increase) long-term control therapy.
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	<p>Step down</p> <p>Review treatment every 1 to 6 months; a gradual stepwise reduction in treatment may be possible.</p>
	<p>Step up</p> <p>If control is not maintained, consider step up. First, review patient medication technique, adherence, and environmental control.</p>

Goals of Therapy: Asthma Control	
<ul style="list-style-type: none"> ■ Minimal or no chronic symptoms day or night ■ Minimal or no exacerbations ■ No limitations on activities; no school/parent's work missed 	<ul style="list-style-type: none"> ■ Minimal use of short-acting inhaled beta₂-agonist (< 1x per day, < 1 canister/month) ■ Minimal or no adverse effects from medications

- Note**
- The stepwise approach is intended to assist, not replace, the clinical decisionmaking required to meet individual patient needs.
 - Classify severity: assign patient to most severe step in which any feature occurs.
 - There are very few studies on asthma therapy for infants.
 - Gain control as quickly as possible (a course of short systemic corticosteroids may be required); then step down to the least medication necessary to maintain control.
 - Provide parent education on asthma management and controlling environmental factors that make asthma worse (e.g., allergies and irritants).
 - Consultation with an asthma specialist is recommended for patients with moderate or severe persistent asthma. Consider consultation for patients with mild persistent asthma.

Appendix 6



Stepwise Approach for Managing Asthma in Adults and Children Older Than 5 Years of Age: Treatment

Classify Severity: Clinical Features Before Treatment or Adequate Control		Medications Required To Maintain Long-Term Control
	Symptoms/Day Symptoms/Night	PEF or FEV ₁ PEF Variability
Step 4 Severe Persistent	Continual Frequent	$\leq 60\%$ $> 30\%$
Step 3 Moderate Persistent	Daily > 1 night/week	$> 60\% - < 80\%$ $> 30\%$
Step 2 Mild Persistent	$> 2/\text{week}$ but $< 1\text{x}/\text{day}$ > 2 nights/month	$\geq 80\%$ 20–30%
Step 1 Mild Intermittent	≤ 2 days/week ≤ 2 nights/month	$\geq 80\%$ $< 20\%$

Quick Relief All Patients	<ul style="list-style-type: none"> Short-acting bronchodilator: 2–4 puffs short-acting inhaled beta₂-agonists as needed for symptoms. Intensity of treatment will depend on severity of exacerbation; up to 3 treatments at 20-minute intervals or a single nebulizer treatment as needed. Course of systemic corticosteroids may be needed. Use of short-acting beta₂-agonists >2 times a week in intermittent asthma (daily, or increasing use in persistent asthma) may indicate the need to initiate (increase) long-term control therapy.
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<p>Step down Review treatment every 1 to 6 months; a gradual stepwise reduction in treatment may be possible.</p> <p>Step up If control is not maintained, consider step up. First, review patient medication technique, adherence, and environmental control.</p>
--

Goals of Therapy: Asthma Control	
<ul style="list-style-type: none"> Minimal or no chronic symptoms day or night Minimal or no exacerbations No limitations on activities; no school/work missed 	<ul style="list-style-type: none"> Maintain (near) normal pulmonary function Minimal use of short-acting inhaled beta₂-agonist (< 1x per day, < 1 canister/month) Minimal or no adverse effects from medications

Note

- The stepwise approach is meant to assist, not replace, the clinical decisionmaking required to meet individual patient needs.
- Classify severity: assign patient to most severe step in which any feature occurs (PEF is % of personal best; FEV₁ is % predicted).
- Gain control as quickly as possible (consider a short course of systemic corticosteroids); then step down to the least medication necessary to maintain control.
- Provide education on self-management and controlling environmental factors that make asthma worse (e.g., allergens and irritants).
- Refer to an asthma specialist if there are difficulties controlling asthma or if step 4 care is required. Referral may be considered if step 3 care is required.



Appendix 7

Training Guidelines for Asthma Management Programs

Qualifications of Instructional Personnel

The trainer should be:

- a school nurse who is trained in asthma management;
- a certified Respiratory Therapist with additional training and interest in asthma education; or
- a health or science teacher with additional training and particular interest in asthma.

Number of Participants

- Smaller classes work well. Many programs recommend six students per session. It also is advisable to group students by grade level (i.e., K-3, 4-5, middle school, and high school).

Length of Program

- Usually 6-8 sessions lasting 30-40 minutes each is advisable.

Content of Training

The following topics should be covered:

- What is Asthma?
- Signs and Symptoms
- Asthma Medications
 - Learning medicine responsibility
 - Using a metered-dose inhaler
 - Using a nebulizer
 - Controlling Asthma Triggers
- Managing Asthma Symptoms
 - Watching for warning signs
 - Using a peak flow meter
 - Responding to symptoms
- Preparing Others (school staff, babysitters, friends, coaches, etc.)
- Terminology
- Keeping an Asthma Diary
- What Not to Do

Training Objectives

Training objectives are to understand:

- asthma and how it affects the body;
- the importance of medication management;
- what triggers the student's asthma;
- how to use a peak flow meter;
- how to use an asthma diary;
- how to respond to an asthma attack; and
- how to communicate with others about the student's asthma.

Training Methods

An interactive format, involving students in demonstrations and using equipment, is an effective way to teach students how to manage asthma. Effective activities include:

- role play signs and symptoms of an asthma episode;
- practice using a peak flow meter;
- demonstrate belly breathing;
- demonstrate straw breathing (breathing through a pinched straw to demonstrate a clogged bronchial tube);
- observe various types of medications and delivery systems;
- discuss and design a trigger-proofed bedroom; and
- provide a question and answer session.

Students should be given a folder to take home and share with their family.

Training Materials

Training materials may include:

- Handouts
- Videos
- Folders and stickers

Appendix 7 continued on next page



- Sample medications and demonstration inhalers
- Peak flow meters
- Straws
- Note cards with various scenarios to role play
- Asthma diary for each child
- Permission letters from parents/guardians to participate in the program

Evaluation

Participants should complete a pre- and post-class knowledge test and demonstrate ability to use medications and peak flow meters correctly.

Documentation of Training Program

The instructor should provide participants with a certificate of completion. The training should also be documented in the child's Asthma Care Plan.



Appendix 8

How Asthma Friendly is Your School

Classroom Asthma Checklist

- Are vacuuming and damp dusting done regularly and thoroughly?
- Is trash removed daily?
- Is food left in the classroom overnight?
- Is animal food stored in tightly sealed containers?
- Are animal cages kept cleaned and away from the ventilation system?
- Are there any signs of pests?
- Have science and art supplies been stored properly?
- Are ventilation hoods in science labs working correctly?
- Are there any signs of molds and moisture?
- Do students take gym clothing and towels home for regular washing?

Building Maintenance Checklist

- Are vacuuming and damp dusting done regularly and thoroughly?
- Is trash removed daily?
- Is food left in the classroom overnight?
- Are there any signs of pests?
- Are ventilation hoods in science labs working correctly?
- Are there any signs of molds and moisture?
- Are bathrooms and locker rooms aired and cleaned well?
- Are outdoor cleanups scheduled periodically?
- Are there any noticeable odors indoors or outdoors?
- Are painting and carpeting done during summer vacation or over a long recess?
- Are Material Safety Data Sheets available for all cleaning products?
- Are classrooms cleaned after all students have left for the day?
- Is heavy cleaning done over the weekend?

Cafeteria Checklist

- Is the cafeteria thoroughly cleaned daily?
- Is trash removed daily?
- Is food stored in airtight containers?
- Are there any signs of pests?
- Are ventilation hoods working correctly?
- Are there any signs of molds and moisture?
- Are there any noticeable odors?

Source: Reilly, 2000